

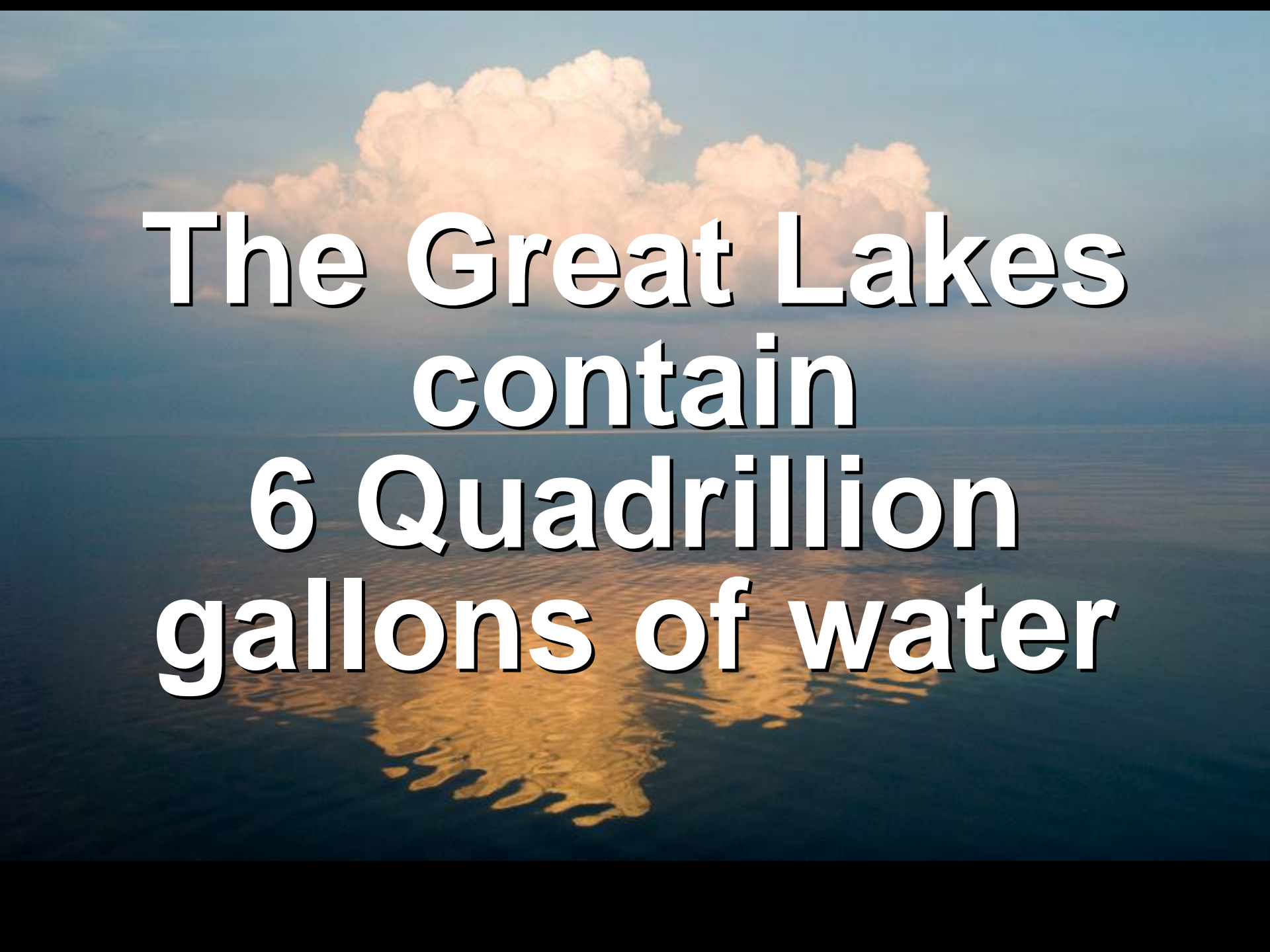
A satellite map of the Great Lakes region in North America, showing the five Great Lakes (Superior, Michigan, Huron, Erie, and Ontario) and the surrounding land. The text is overlaid on the map.

**Ecosystem Restoration at the
Landscape Scale:**


**Great Lakes Restoration
Initiative**

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**The Great Lakes
contain
6 Quadrillion
gallons of water**

A photograph of a lighthouse on a rocky shore. The lighthouse is a tall, cylindrical structure with a dark body and a lighter-colored top section. It is situated on a rocky outcrop. In the foreground, there are large, white, foamy waves crashing against the base of the lighthouse. The sky is a clear, pale blue. The text "18% of world's and 95% of North America's fresh surface water" is overlaid on the image in a large, white, sans-serif font with a black outline.

**18% of world's
and 95% of North
America's fresh
surface water**



**Daily,
56 billion gallons
of water are used by
municipalities,
agriculture, and
industry**

A close-up photograph of a young child with light brown hair, wearing a blue shirt, drinking water from a public fountain. The child's face is the central focus, with their mouth open and tongue touching the water. The fountain's spout is visible in the lower right, with a stream of water flowing into the child's mouth. The background is dark and out of focus.

**42 million people
depend on the Great
Lakes for their
drinking water**

A scenic view of a beach with waves crashing onto the shore under a clear blue sky. The text "17,000 kilometers of coastline" is overlaid in large white letters with a black outline.

**17,000 kilometers
of coastline**

A vibrant, high-angle photograph of a crowded beach on a sunny day. Numerous people are scattered across the sandy shore, some lying on towels, others standing or walking. The beach is bordered by a line of trees on the left and a calm body of water on the right. In the distance, several sailboats and a small island are visible under a clear blue sky. The text '600 sand beaches in the U.S.' is overlaid in large, white, bold letters with a black outline, centered on the image.

**600 sand
beaches
in the U.S.**

A scenic photograph of a freshwater sand dune system. In the foreground, waves with white foam are crashing against a sandy beach. To the right, a large, grassy sand dune rises, with some trees and shrubs growing on its crest. The sky is blue with scattered white clouds. The text "World's largest collection of freshwater sand dunes" is overlaid in the center in a large, white, bold font with a black outline.

World's largest collection of freshwater sand dunes



31,000 islands

An aerial photograph of a coastal wetland area. The foreground and middle ground are filled with lush green marshland, interspersed with winding water channels and small ponds. In the background, a large, calm body of water, likely a bay or ocean, stretches to the horizon under a clear blue sky. The text "217,000 hectares of coastal wetlands" is overlaid in the center in a large, white, bold font with a black outline.

**217,000
hectares of
coastal
wetlands**

A scenic view of a river with a large crowd of people fishing from a concrete walkway. The text '\$1 billion/year recreational fishing industry' is overlaid in large white letters. The scene is set on a sunny day with a blue sky and scattered white clouds. The river is a vibrant greenish-blue, and the surrounding area is lush with green trees. In the background, a bridge is visible across the river. The people are dressed in casual summer attire, and many are holding fishing rods, indicating a popular recreational spot.

**\$1 billion/year
recreational
fishing industry**

**70 million people
visit parks
annually**



An aerial photograph of a large cargo ship, likely a container ship, navigating through a canal lock. The ship is positioned centrally, moving from the background towards the foreground. It has a white hull and a red upper section. The water is a deep greenish-blue. On either side of the ship are concrete lock walls. A large crowd of people is gathered along the left side of the lock, watching the ship pass. In the background, a green, hilly shoreline is visible under a clear blue sky. The text "\$100 billion in world trade" is overlaid in large, white, bold letters with a black outline, centered over the ship and the water.

**\$100 billion
in world trade**



Persistent harmful chemicals have been an enduring legacy for at least a hundred years, posing a threat to human and wildlife health

Invasive nuisance species are disrupting the food web and causing billions of dollars in damage to infrastructures such as water intakes. It appears the fishery is being affected





Destruction of habitats such as wetlands and river corridors, is resulting in diminished ecosystem services

We—human beings—are part of
'biodiversity.' We are
dependent on the whole food
chain down below us

Darrell Merrell, heirloom vegetable farmer

Great Lakes Water Quality Agreement





Great Lakes Interagency Task Force

- Created by Executive Order in 2004 to coordinate Federal Great Lakes protection and restoration efforts
- IATF coordinates Great Lakes activities of 11 Departments/Agencies at Department level
- A Regional Working Group coordinates activities at the Regional Program Director level





FY2010 - FY2014

Great Lakes Restoration Initiative Action Plan

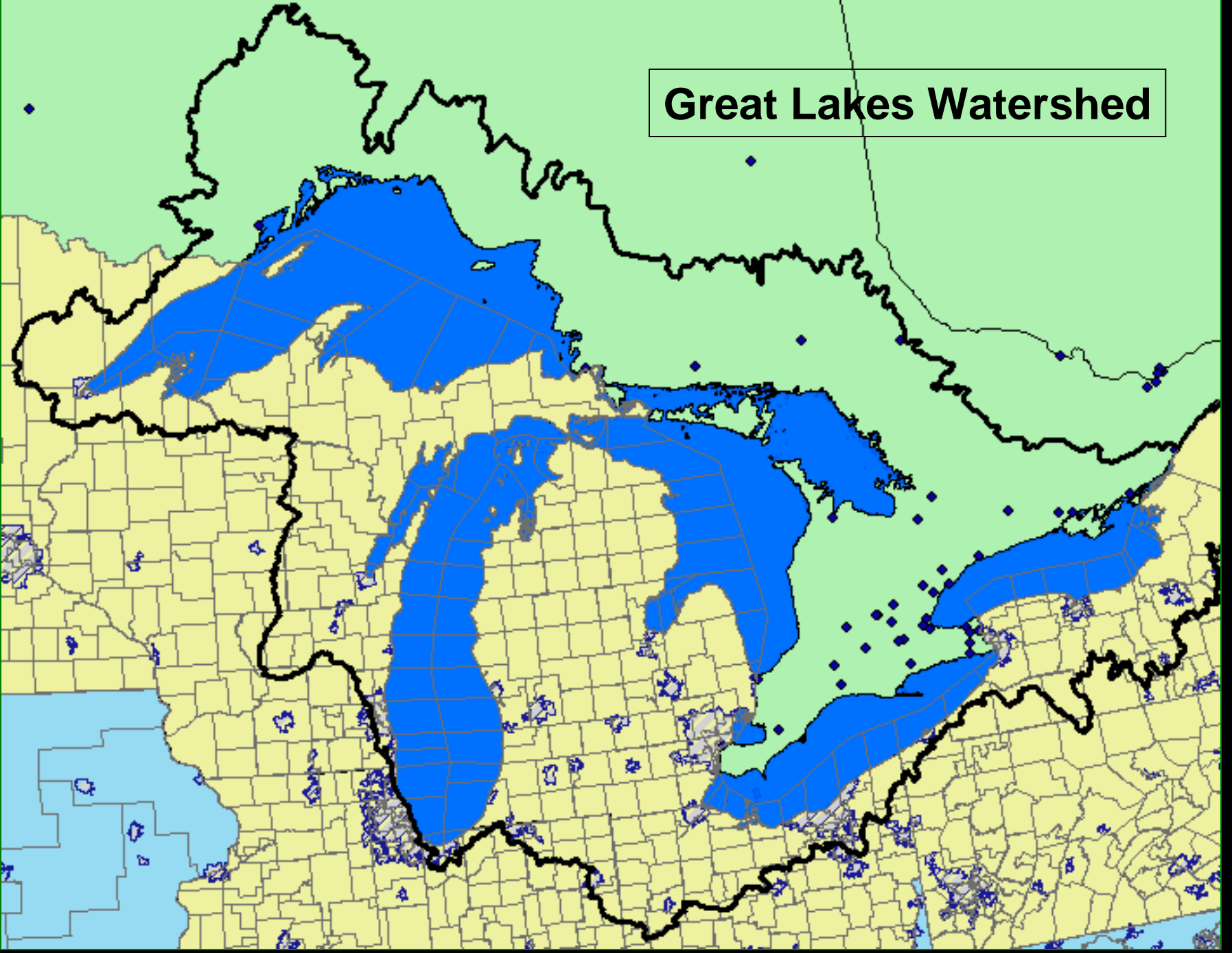


DRAFT September 2009

*White House Council on Environmental Quality
U.S. Department of Agriculture
U.S. Department of Commerce
U.S. Department of Health and Human Services
U.S. Department of Homeland Security
U.S. Department of Housing and Urban Development
U.S. Department of State
U.S. Department of the Army
U.S. Department of the Interior
U.S. Department of Transportation
U.S. Environmental Protection Agency*

Toxic Substances and
Areas of Concern
Invasive Species
Nearshore Health and
Non-Point Source
Pollution
Habitat and Wildlife
Protection and
Restoration
Accountability,
Education, Monitoring,
Evaluation,
Communication, and
Partnerships

Great Lakes Watershed





What is ecological restoration?

- Ecological restoration is the process of assisting with the recovery of an ecosystem that has been degraded, damaged or destroyed (Society for Ecological Restoration International—www.ser.org)



What is ecological restoration?

- Ecological restoration is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability
- Restoration attempts to return an ecosystem to its historic trajectory



What interventions are employed in ecological restoration?

- Interventions employed in ecological restoration vary widely among projects and programs
 - Removal or modification of a specific disturbance
 - Deliberate reintroduction of native species
 - Facilitate the resumption of those processes which will return the ecosystem to its intended trajectory



What interventions are employed in ecological restoration?

- Ecological restoration may include the recovery of indigenous ecological management practices, including support for the cultural survival of indigenous people and their languages as living libraries of ecological knowledge
- What makes ecological restoration especially inspiring is that cultural practices and ecological processes can be mutually reinforcing



What is meant by “recovery” in ecological restoration?

- An ecosystem has recovered - and is restored - when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy



Before

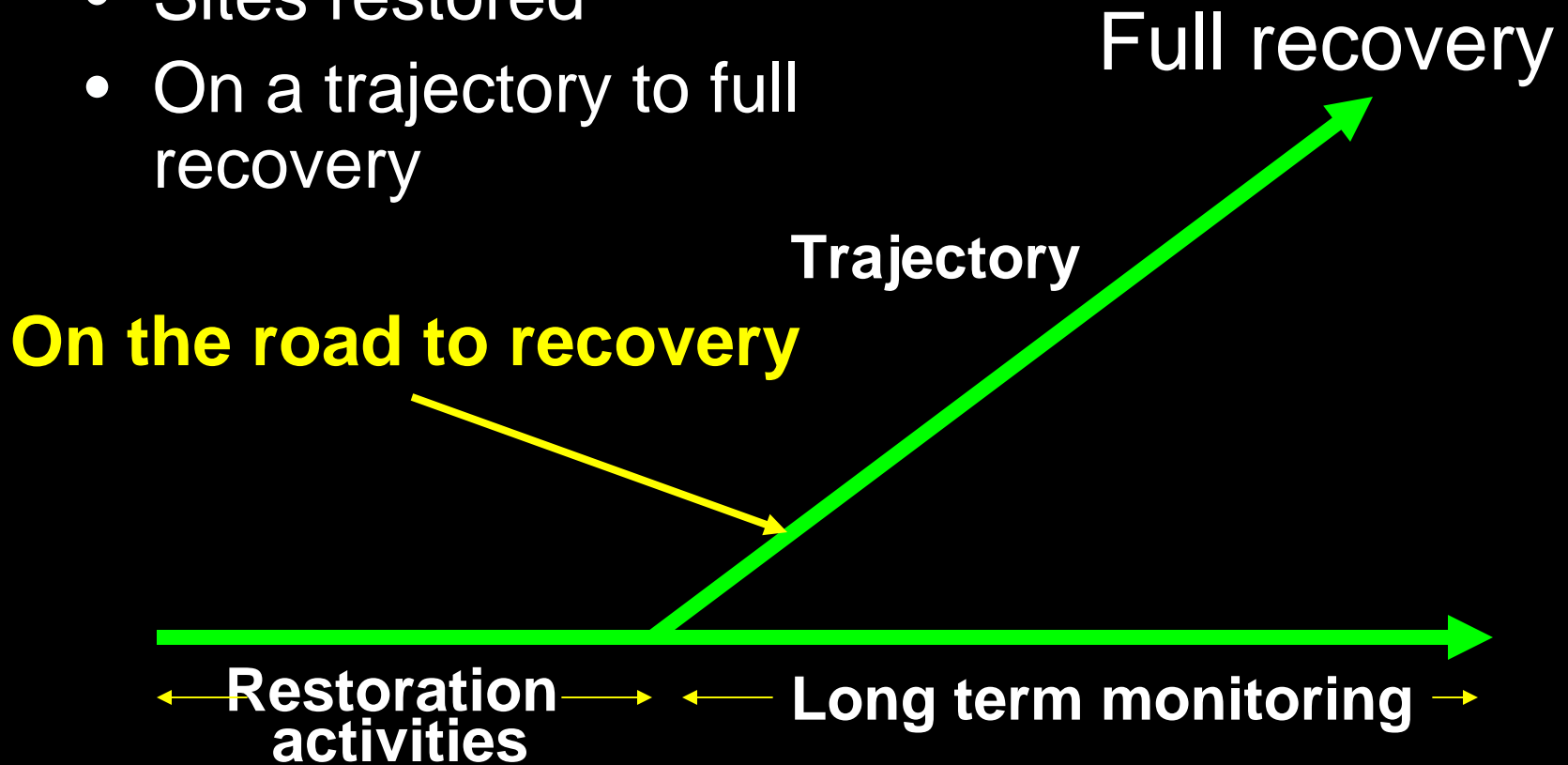


After

Ft. Erie, Niagara Peninsula Conservation Authority

Habitat restoration timeline

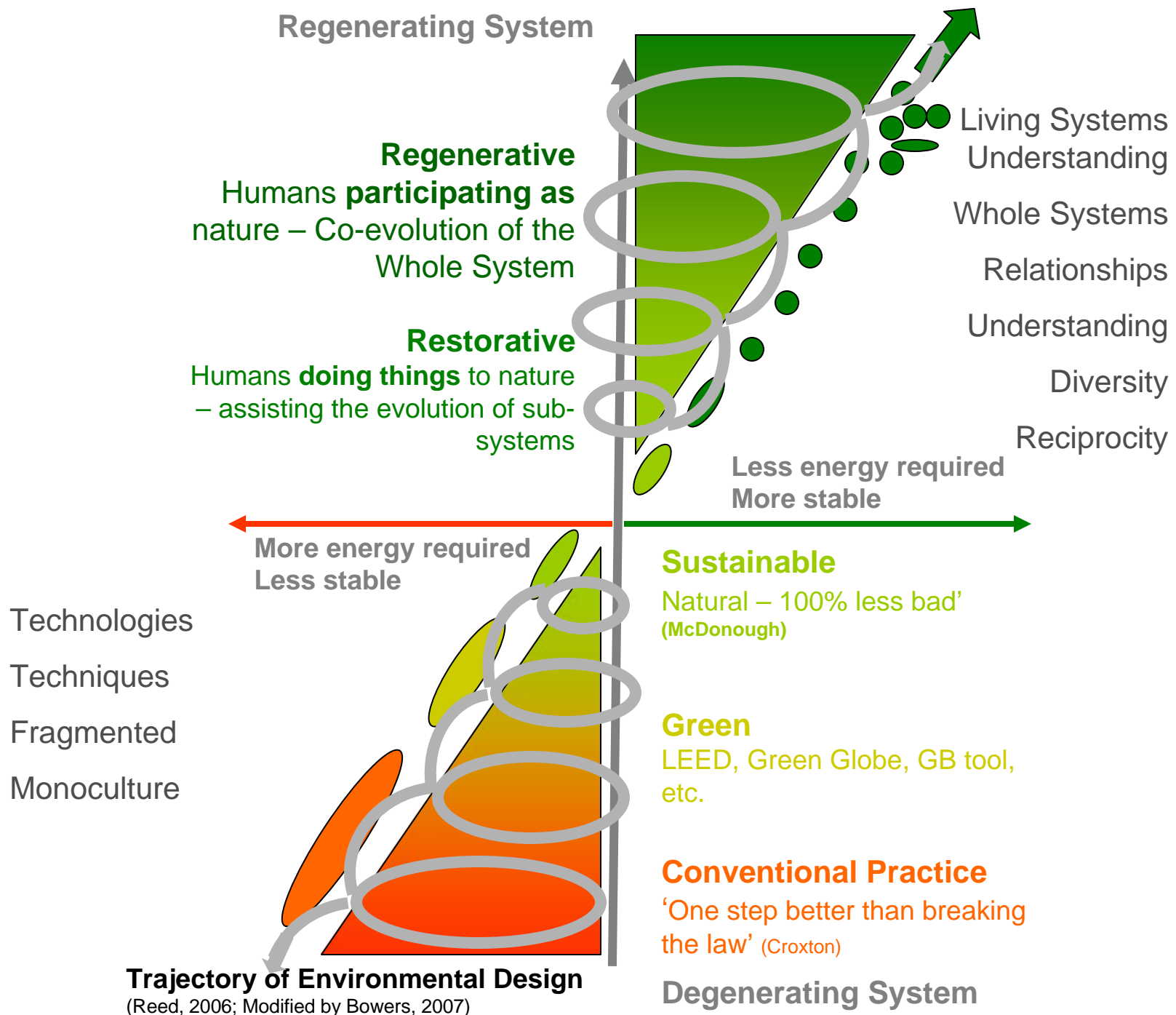
- Sources controlled
- Sites restored
- On a trajectory to full recovery



Restoring to the Future

The activist is not the man who says the river is dirty. The activist is the man who cleans up the river

Ross Perot

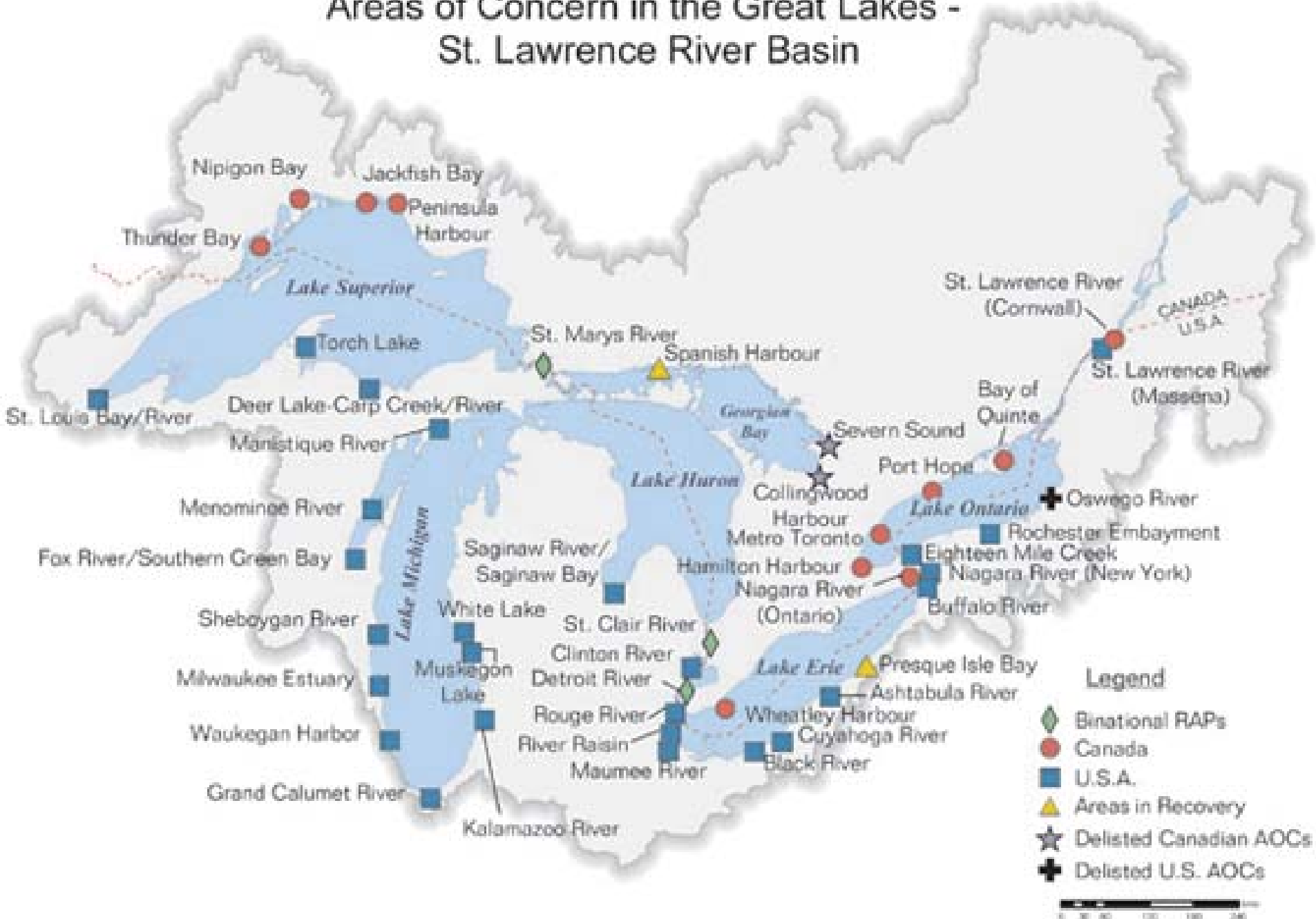




PCBs in Lake Michigan Lake Trout



Areas of Concern in the Great Lakes - St. Lawrence River Basin





Ashtabula, OH

Estimate: ~75,000,000 yd³ of contaminated sediments remain, with an associated cost of \$1 - \$4 Billion for remediation!



Black Lagoon





Elias Cove



01/04/2007

Objective C5) Enhance migratory bird habitats, especially for rare, threatened, or endangered (RTE) species.

Restoration Trajectory: Expand available shorebird habitat on Hog Island and within the Hog Island Inlet.

Examples of wading shorebirds. Clockwise from top left, piping plover, spotted sandpiper, American avocet, existing beach on Hog Island.



Hog Island has many environmental features that provide for great bird habitat. It lies along migratory routes on the western edge of Lake Superior; it is relatively secluded, quiet, and free of human habitation; it contains a variety of habitat types, including wetlands, beaches, mud flats, grasslands, and woodlands, which attract a diversity of bird species. Even though it already provides excellent habitat conditions for avian species, it could be enhanced to provide additional bird habitats.

For example, the harbor side beaches of Hog Island could be expanded through vegetation management to enhance suitable conditions for wading shorebirds, including the spotted sandpiper (*Actitis macularia*) and potentially the piping plover (*Charadrius vociferans*) which is listed in the Great Lakes area as a federally endangered species. Wetland restoration actions proposed in Objective C3 will increase suitable habitat for the least bittern (*Icthyophaga exilis*), which is listed in the State of Wisconsin as a species of special concern.

Although piping plover is specified as a restoration target in the LSLRHR the use of Hog Island as piping plover habitat is debatable, considering the potential for predation, noise and light pollution. In addition, the available beach area may not be large enough to provide the necessary habitat conditions for nesting. However, the restoration and management of this area as wading shorebird habitat will expand the range of potentially suitable piping plover foraging habitat in the region, including Superior Harbor dredge material islands and nearby Wisconsin Point.

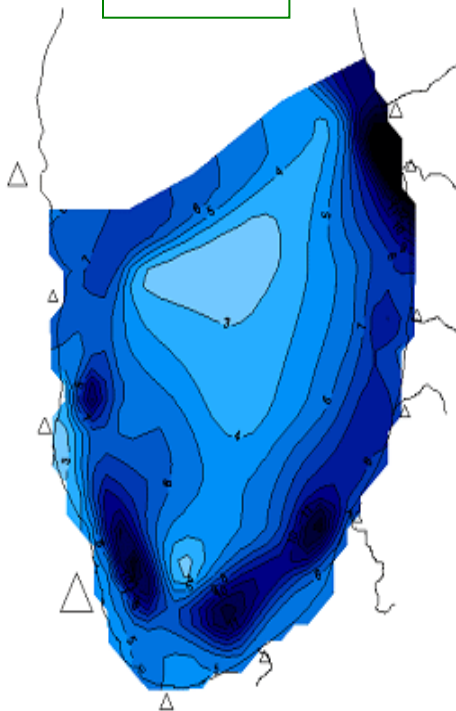


Proposed enhancements of shorebird habitats.

Densities of *Diporeia* in southern Lake Michigan

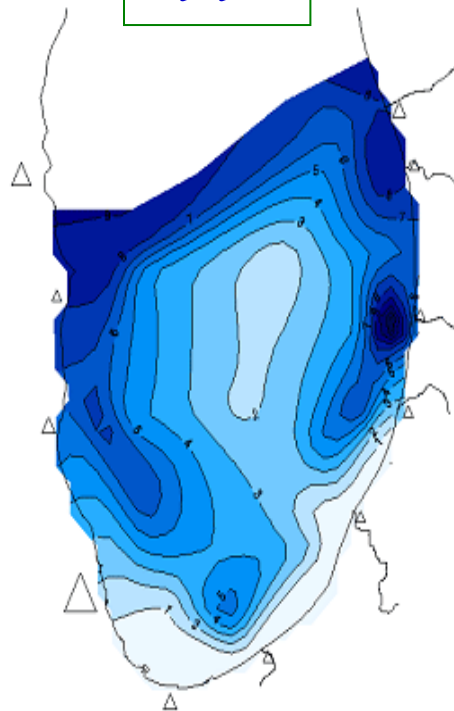


1980



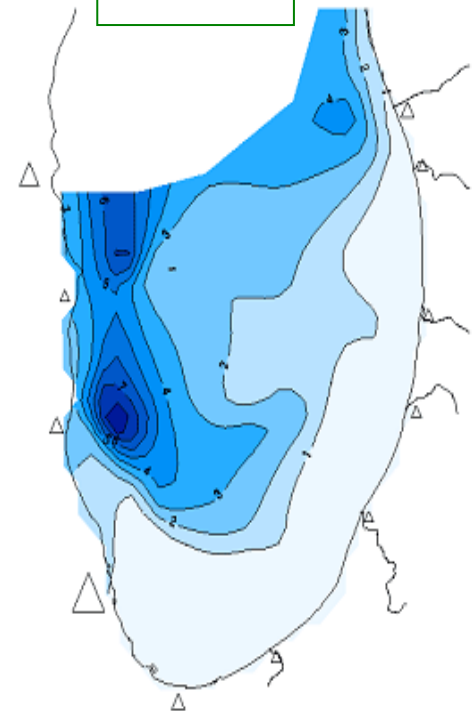
0 3 6 9 12 15
Density (No. $m^{-2} \times 10^5$)

1993



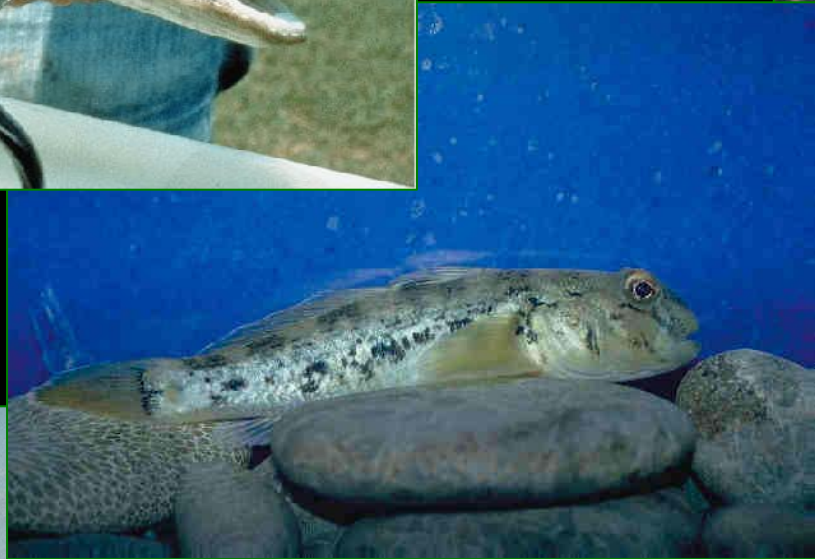
0 3 6 9 12 15
Density (No. $m^{-2} \times 10^5$)

2000



0 3 6 9 12 15
Density (No. $m^{-2} \times 10^5$)

Invasive nuisance species

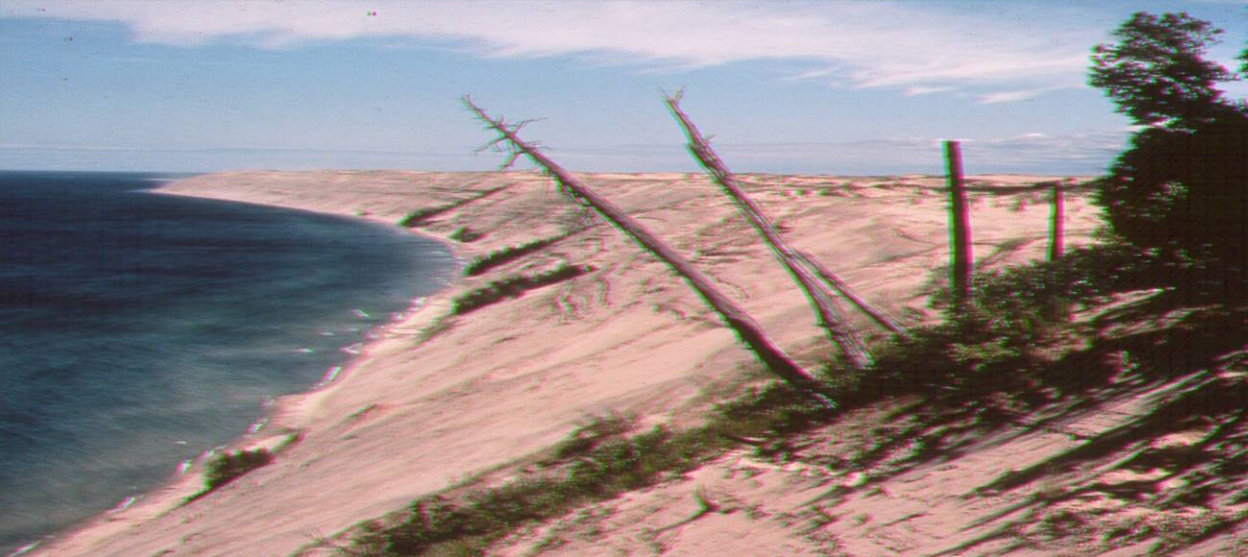


Commercial Ship, 14 Months' Activity



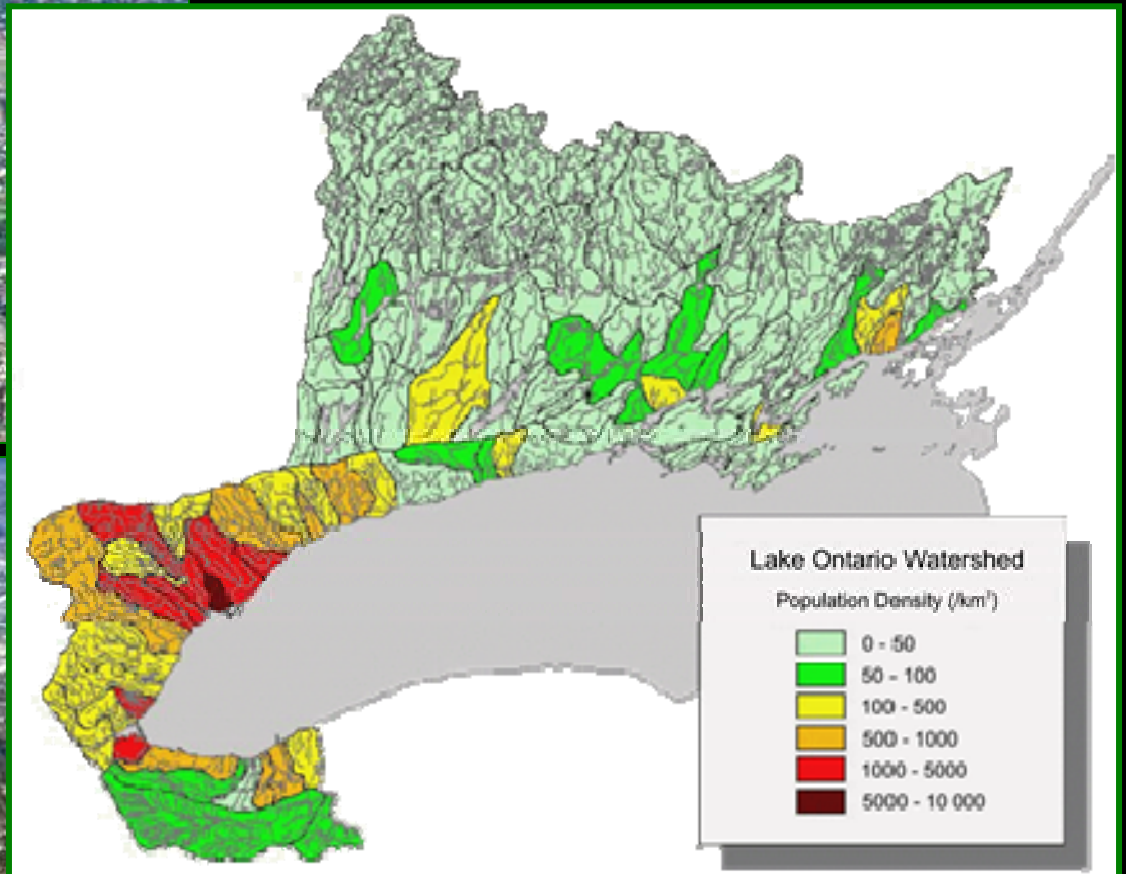
Hugh MacIsaac, Great Lakes Institute



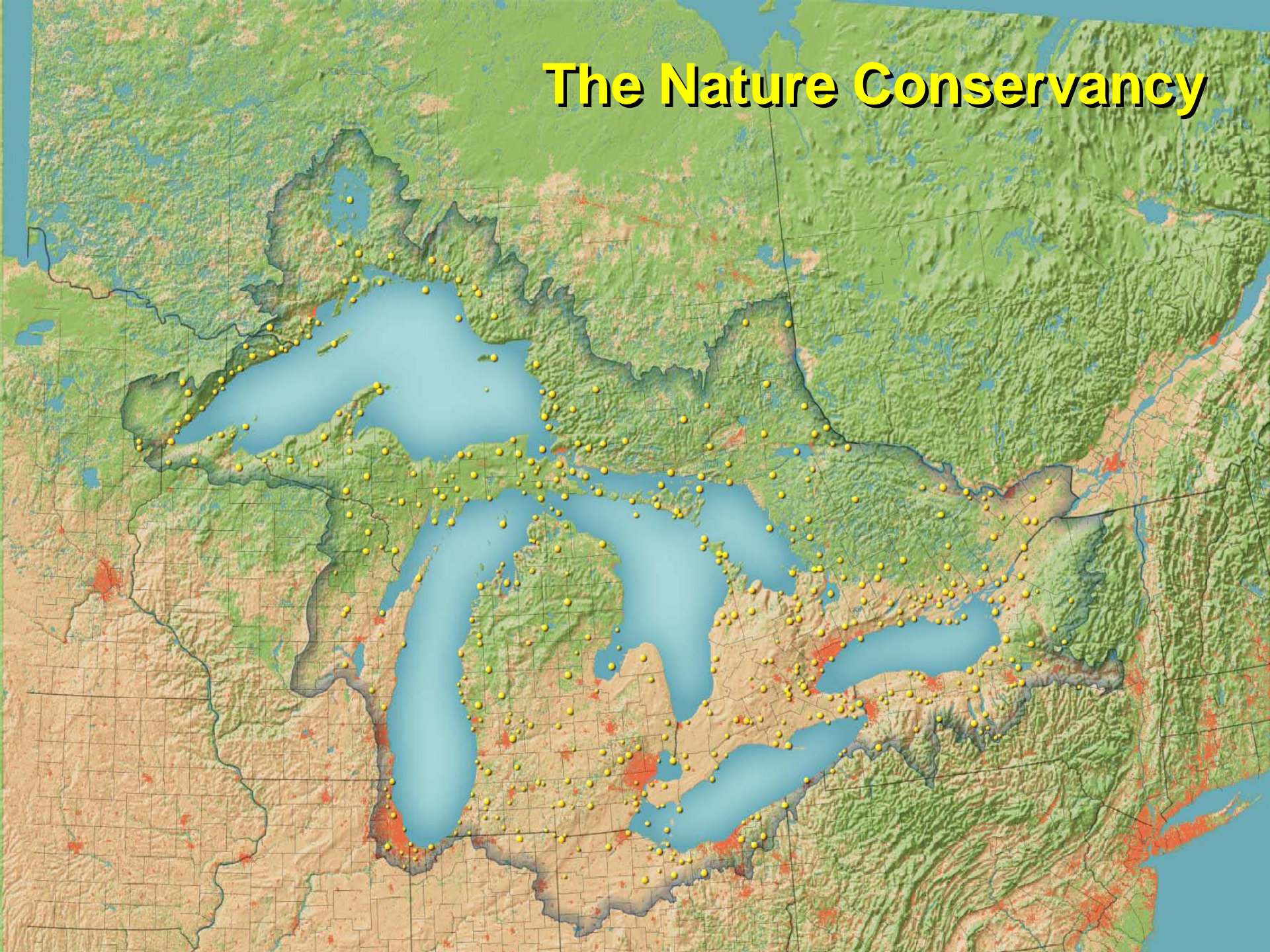




Urbanization in the Golden Horseshoe



The Nature Conservancy



Eastern Lake Ontario





Ashland, Wisconsin





**Miller Woods
Indiana**

Lake St. Clair

Detroit River

Lake Erie





Belanger Park

Detroit River



Woodland, Belle Isle

Oak Savanna, Ojibway Prairie Ontario

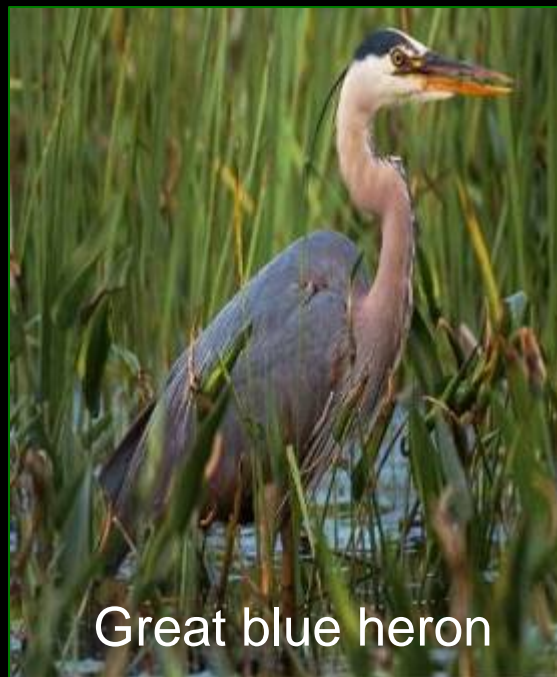


Langlois St. to Moy Ave.

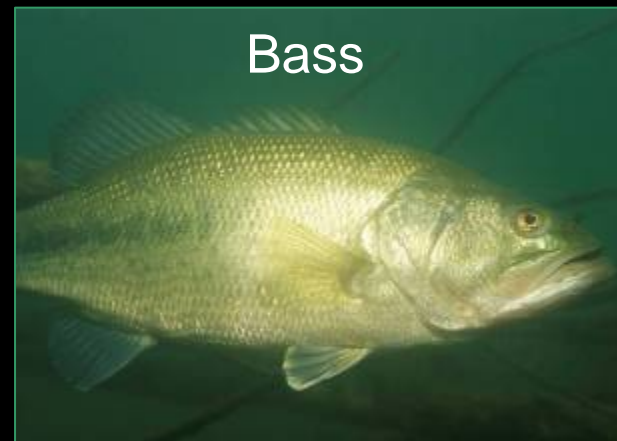




Whitefish



Great blue heron



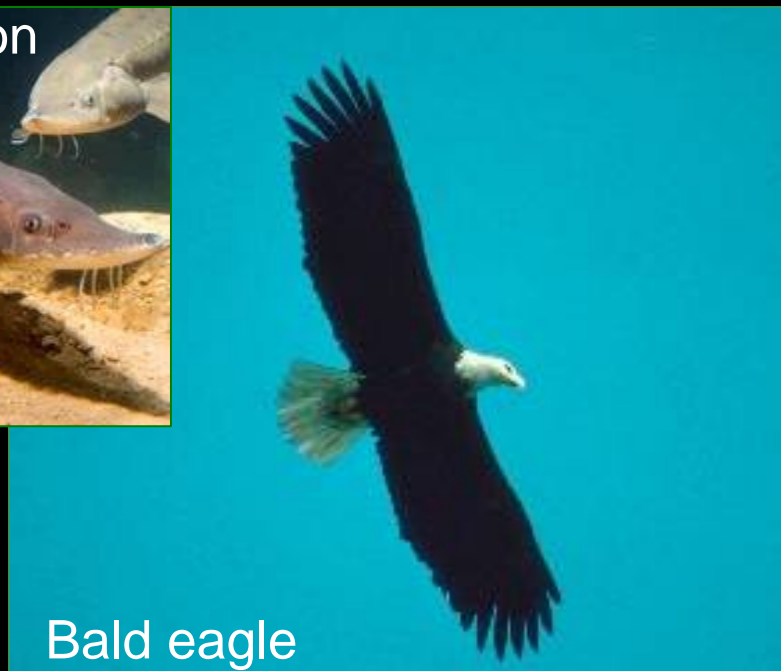
Bass



Walleye



Lake sturgeon



Bald eagle



Peregrine falcon



Status and Trends of Key Indicators 2007

Detroit River and Western Lake Erie



State of the Lakes Ecosystem Conference (SOLEC)

www.epa.gov/glnpo/solec

Biennial assessment

Binational participation

Based on a suite of indicators

Indicators grouped into Bundles for overall assessments

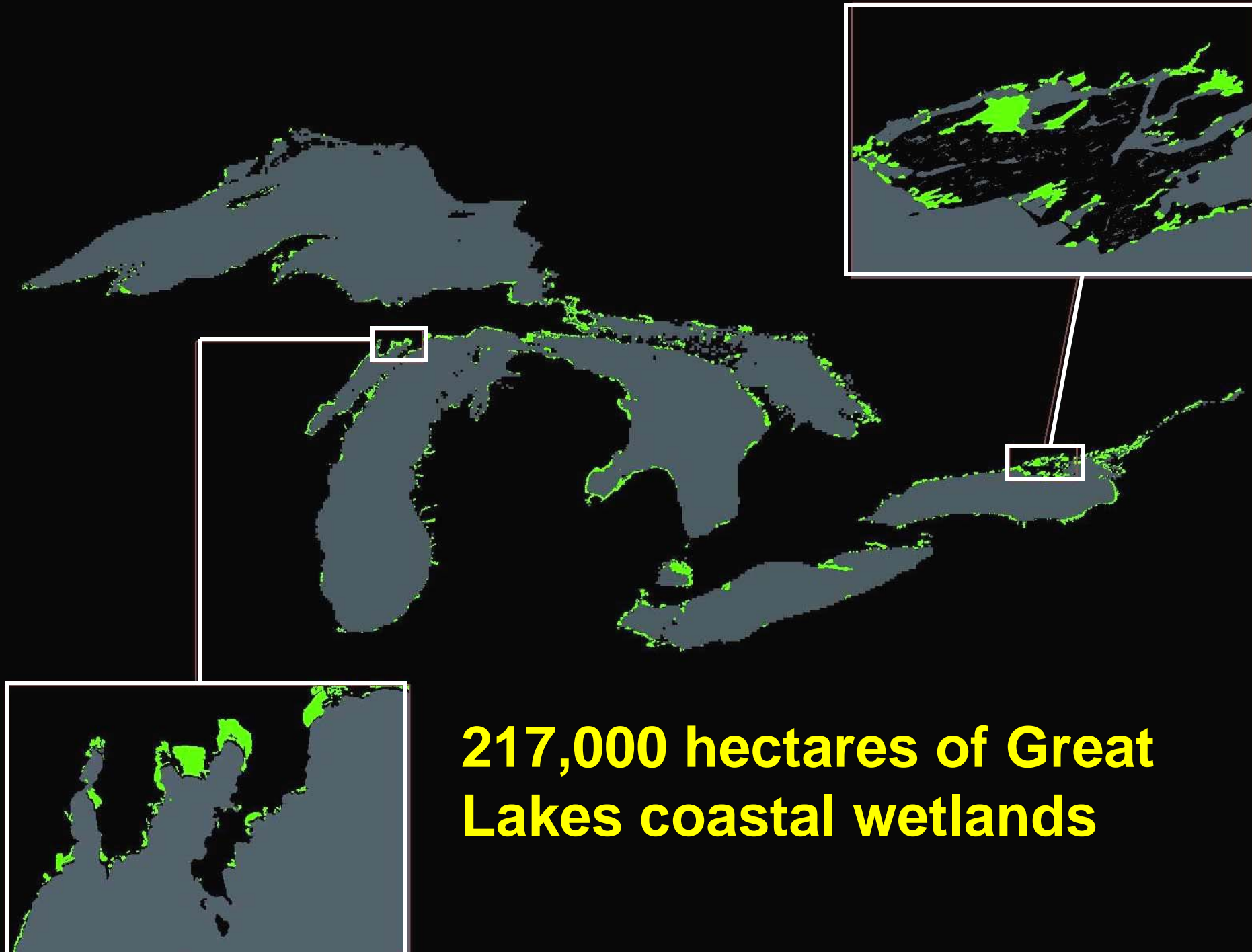
3-year Cycle:

- Monitoring & Assessments
- Indicator Reports
- Workshops
- Background Papers
- Conference

*State of the Great Lakes
Highlights and Technical
Reports*

SOLEC

- 800 down to 80 indicators
- Necessary, sufficient, feasible
- Chemical, physical, biological
- Not regulatory, not research—we don't set endpoints or standards
- Goals: influence not dictate monitoring, overview of conditions leading to allocation of resources
- Requires ownership



Things We Have Learned over the last 35+ years:

- Politics is necessary but don't deviate from focusing on the resources
- Leadership—individual and organizational—is needed to achieve consensus, but consensus is not needed to act
- Deal with each and every bureaucratic barrier (and there are many) compassionately
- Seek input from everyone, even those who will argue against restoration

Things We Have Learned over the last 35+ years:

- Build your arguments as to why monitoring, indicators and assessment are necessary using plain, understandable language
- If you build a decision support system, they may not come—unless they are at the table
- Without money, you can still build a foundation for future actions
- Be prepared



**EPA Great Lakes Research Vessel
The Lake Guardian**



**Humbug Island
Detroit River**



When we save a river, we save a major part of an ecosystem, and we save ourselves as well because of our dependence—physical, economic, spiritual—on the water and its community of life

Tim Palmer, *The Wild and Scenic Rivers of America*



Karner blue butterfly

Indiana Dunes Area Gary, Indiana

Yellow lady's slipper orchid



Trout Lilies at Belle Isle, Detroit River, Michigan



An aerial photograph of the Great Lakes region, showing the five large lakes (Superior, Michigan, Huron, Erie, and Ontario) surrounded by green and brown land. The text is overlaid on the image.

Great Lakes Restoration Initiative

www.epa.gov/glnpo

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